

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. -10. (cancelled)

11. (new) A network forwarding device connecting a plurality of networks comprising:

a port to which one of said networks is connected;

 a network interface connected to said port and controlling an interface with the network connected to said port; and

a routing processor connected to said network interface via an intra-device communication line and performing routing of a packet received from said network interface;

wherein said routing processor includes:

path information generating unit for generating path information comprising a plurality of 2-branch tree nodes, each corresponding to a value which can be taken by each bit of a destination address of said packet;


path information holding means for holding said path information generated;

and

next-path searching means for checking each bit of said destination address

of said packet received from a high-order bit one by one and determining a path to which said packet received is to be forwarded next by retrieving said 2-branch tree nodes of said path information corresponding to each bit value of said destination address; and

wherein, said path information generating unit combines a total of (2^P-1) 2-branch tree nodes comprising one 2-branch tree node and 2-branch tree nodes of $(p-1)$ levels connected to said one 2-branch tree node, into one 2^P -branch tree node and outputs said one 2^P -branch tree node as said path information to said path information holding means, wherein said p is an integer equal to or larger than 2, and

 wherein said next-path searching means checks p bits of said destination address of said packet received at one time and retrieves 2^P -branch tree node corresponding to values of said p bits.

12. (new) The network forwarding device according to claim 1 wherein said 2^P -branch tree node is formed by combining $2^{(P-1)}$ 2-branch tree nodes, and said 2^P -branch tree node comprises path data included in said (2^P-1) 2-branch tree nodes, and when each of said (2^P-1) 2-branch tree nodes includes the same data, said 2^P -branch tree node comprises said same data as one data.

13. (new) The network forwarding device according to claim 3 wherein said next-path searching means does not read a whole node when reading the 2^P -branch tree node from said path information holding means but reads only data

corresponding to one of the $2^{(P-1)}$ 2-branch tree nodes combined when the 2^P -branch tree node was created.

14. (new) The network forwarding device according to claim 4, wherein said path information generating unit stores mask length corresponding to said 2^P -branch tree node, not mask length corresponding to other 2^P -branch tree node storing a pointer for said 2^P -branch tree node,

and wherein said next-path searching means comprehends mask length corresponding to said 2^P -branch tree node to be read later, when data of said other 2^P -branch tree node is read and selects a portion of data to be read from said 2^P -branch tree node according to values of p bits beginning from a bit position indicated by said mask length in said destination address of said packet received.

15. (new) The network forwarding device according to claim 4 wherein said 2^P -branch tree node comprises a flag as a data which is first read by said next-path searching means, said flag indicating whether or not a path is allocated to said 2^P -branch tree node,

and wherein when said next-path searching means reads said 2^P -branch tree node from said path information holding means, said flag is first read, and when said flag indicates that a path is not allocated, said next-path search means does not read path data.

16. (new) The network forwarding device according to claim 1 wherein said network forwarding device is a router.

17. (new) The network device according to claim 1, wherein said path information generating unit generates 2^m 2^P -branch tree nodes ($2^m \times (2^P - 1)$) 2-branch tree nodes, said 2^m 2^P -branch tree nodes respectively corresponding to mask lengths from m bit to (m-(p-1)) bit, wherein said m is a natural number, and

wherein each 2^P -branch tree node is stored in a predetermined region of said path information holding means, and

wherein said next-path searching means selects one region among regions storing each 2^P -branch tree node according to a value represented by bits 0-th bit to (m-1)th bit of said destination address of said packet received, and reads one 2^P -branch tree node from said region selected in said path information holding means.

18. (new) A network forwarding device connecting a plurality of networks comprising:

a port to which one of said networks is connected;

a network interface connected to said port and controlling an interface with the network connected to said port; and

a routing processor connected to said network interface for performing routing of a packet received from said network interface;

a management unit connected to said routing processor via an intra-device

communication line for generating path information and delivering said path information to said routing processor, said path information including a plurality of 2-branch tree nodes, each corresponding to a value can be taken by each bit of a destination address of a packet;

wherein said routing processor includes:

a memory for holding said path information delivered from said management unit; and

next-path searching means for checking each bit of said destination address of said packet received from a high-order bit one by one and determining a path to which said packet received is to be forwarded next by retrieving said 2-branch tree nodes of said path information corresponding to each bit value of said destination address; and

wherein, said management unit combines a total of $(2^p - 1)$ 2-branch tree nodes comprising one 2-branch tree node and 2-branch tree nodes of $(p-1)$ levels connected to said one 2-branch tree node, into one 2^p -branch tree node and delivers said one 2^p -branch tree node as said path information to said routing processor, wherein said p is an integer equal to or larger than 2, and


wherein said next-path searching means checks p bits of said destination address of said packet received at one time and retrieves said 2^p -branch tree node corresponding to values of said p bits.

19. (new) A network next-hop search method for use in a network forwarding

device connected to a plurality of network and transmitting a packet received from one of said networks to a next hop based on path information comprising the steps of:

generating path information comprising a plurality of 2-branch tree nodes, each corresponding to a value which can be taken by each bit of a destination address of a packet;

holding said path information generated;

 checking bits of said destination address of said packet received from a high-order bit one by one and retrieving said 2-branch tree nodes corresponding to each bit value; and

determining a path to which said packet received is to be forwarded next

wherein, said step of generating a path information combines a total of $(2^p - 1)$ 2-branch tree nodes comprising one 2-branch tree node and 2-branch tree nodes of $(p-1)$ levels connected to said one 2-branch tree node, into one 2^p -branch tree node as said path information, wherein p is an integer equal to or larger than 2,

and said step of retrieving checks p bits of said destination address of said packet received at one time and retrieves said 2^p -branch tree node corresponding to values of said p bits.
